

U.S. Census Bureau

**Field Data Collection Automation (FDCA):
Program Scope, Processes, and
Automation Considerations**

DRAFT

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This document informs ongoing discussions related to our efforts to plan, develop, and test a Field Data Collection Automation (FDCA) Program for the 2010 Census.

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1. Introduction

1.1 Purpose

The purpose of this document is to provide an overview of the major elements of the Field Data Collection Automation (FDCA) Program for internal and external Census Bureau stakeholders, and potential FDCA contractors. This document also provides descriptions of the Decennial Census field operations and support processes that the U.S. Census Bureau currently plans to support through the FDCA Program for the 2010 Census. Included in these descriptions are the automated functions that the Census Bureau is currently considering to develop and/or acquire through a contractor under an upcoming FDCA contract. The Census Bureau plans to release a draft statement of work for this contract in the spring of 2005. The FDCA final statement of work will reflect the official scope of the work for the FDCA contract.

1.2 Organization of This Document

Section 2 presents an overview of the Decennial Census process and the role of FDCA. The scope of the FDCA Program and its constituent elements are described in Section 3. Appendix A, *Field Organization and Operational Management*, describes field infrastructure and common support processes of field operations. Appendix B, *Field Data Collection Processes*, describes field operations to improve address coverage, enumeration processes, and evaluation and experiments that FDCA must support. Appendix C, *General Automation Considerations*, provides a discussion of the issues that apply across the entire FDCA Program.

2. Decennial Census Overview and the Role of FDCA

Once every 10 years, as mandated by the U.S. Constitution, the Census Bureau conducts a census of the population and housing, known as the Decennial Census. The next Decennial Census will occur in 2010. The information gathered during the Decennial Census has many uses. First and foremost, the government uses the population counts by state to determine the number of congressional seats each state will have in the U.S. House of Representatives (reapportionment). Second, states use small area population counts for redrawing congressional and state legislative district boundaries (redistricting). Finally, the Decennial Census information is used to determine the distribution of federal funds to state, local, and tribal governments, and has proven increasingly important to supporting the economic and social development of the country.

Basic Decennial Census Process

In brief, the basic Decennial Census Process consists of the following elements. Appendix B, *Field Data Collection Processes*, contains more detailed information about many of the basic processes.

1. The vast majority of the housing units in the country will receive paper census questionnaires delivered either by mail or by census field workers before April 1, 2010. This requires a complete and accurate address list and an accurate geographic database. To this end, the Census Bureau will update the existing Master Address File (MAF), which contains the inventory of living quarters in the United States, using various sources and techniques. These sources and techniques include obtaining delivery point address files from the United States Postal Service (USPS), establishing partnerships with local government officials, and field canvassing operations.
2. The Census Bureau also will enhance the existing geographic database—the Topologically Integrated Geographic Encoding and Referencing System (TIGER), which contains street and map features as well as political and statistical boundaries used for data collection and tabulation of census results. The Census Bureau will improve the accuracy of the street and map features by having them in Global Positioning System (GPS) alignment. [collect GPS coordinates structures containing living quarters]
3. Occupants of the housing units who receive a census questionnaire, whether delivered by mail or by a field worker, are asked to complete and return the questionnaire form by mail to a data center for capture and normalization.
4. When housing units do not respond to questionnaires by a certain deadline, field workers will follow up and collect census data through personal interviews. The response rate for mail returns has been in the 60 percent range. Accordingly, this operation, known as Nonresponse Followup (NRFU), accounts for the largest single component of the field data collection workload and budget.

5. The Census Bureau relies on special procedures to handle areas or living quarters that are not suitable for mailing or delivering census questionnaires. Although these operations only cover a relatively small percentage of the population, they greatly increase the complexity of Decennial Census field operations.
6. After the Census Bureau completes the data capture of census forms, responses are unduplicated, edited, summarized, and tabulated at various statistical and political geographic levels. Census tabulated data are made available in summary form with no individual identifiers.

Decennial Census Planning, Testing, and Implementation Process

The Census Bureau is committed to using effective automation technology to improve operations and reduce resource requirements. Automation is expected to produce new efficiencies in key areas by automating the Address Canvassing, Nonresponse Followup and Census Coverage Measurement Person Interview operations, thereby reducing paper and improving data quality.

To successfully implement automation technology in the 2010 Census, the Census Bureau must fully test it under census-like conditions in advance of Census Day. This requires a sustained, multi-year effort of integrated planning, development, testing, revision, and retesting of all the procedures and systems needed to complete a successful census. This testing cycle includes major field site tests in 2004 and 2006, national tests in 2003 and 2005, as well as various special purpose tests. The 2008 Dress Rehearsal will be a final operational test of the entire complement of methodological, procedural, and systems innovations designed to control cost, mitigate risk, and improve data accuracy and coverage in the 2010 Census.

Figure 1 presents a high-level schedule for the integrated planning, research, and development of testing methods that lead to the Dress Rehearsal and conduct of the 2010 Census. Given this schedule, there is only a short development window to meet the Dress Rehearsal dates.

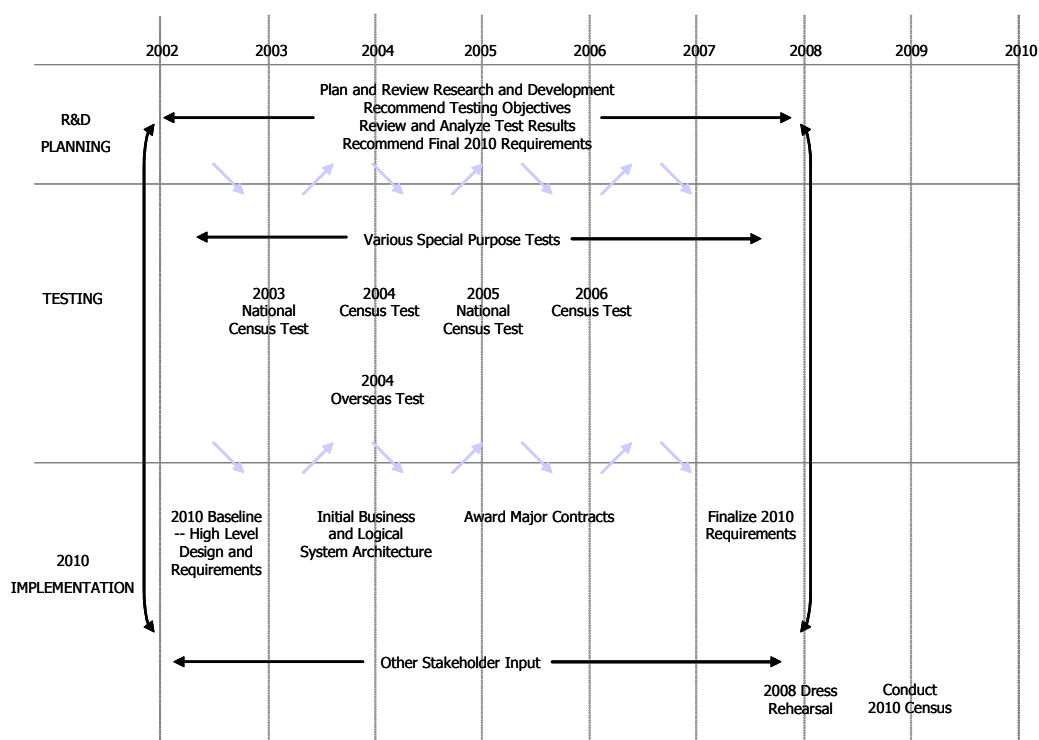


Figure 1. Overview of Decennial Census Planning, Testing, and Implementation

Challenges to Decennial Census Field Operations

The Decennial Census is a huge undertaking and presents unique operational challenges for the Census Bureau's temporary field data collection organization:

- As mandated by Title 13, U.S. Code, the Census Bureau must provide to the President the state reapportionment counts by December 31, 2010, nine (9) months after Census Day. It is thus critical that all field data collection operations be completed in a timely manner to allow the Census Bureau to meet legal deadlines.
- Hiring and training over a million temporary employees, and at peak, paying in excess of 500,000 employees to conduct the field operations each week.
- Establishing approximately 455 temporary offices to manage field operations throughout the 50 States, the District of Columbia, and the Commonwealth of Puerto Rico.

Ultimately the success of the 2010 Census will be measured by its ability to meet legal deadlines, maintain or improve coverage for all population groups and geographic levels, contain costs, and mitigate risks.

The Role of FDCA

In the past, field data collection was predominantly handled through paper address lists, maps, and questionnaires. Although this approach has been developed and used successfully for all previous Decennial Censuses, reinventing data collection business practices and reducing the data collection infrastructure necessary to handle the paper-based operations will reduce decennial census costs.

For the 2010 Decennial Census, the Census Bureau plans to use automation to directly capture information collected during personal interviews and eliminate the need for paper maps and address lists for the two largest field data collection operations (Address Canvassing and Nonresponse Followup) and the Census Coverage Measurement Person Interview process. The Census Bureau believes that the cost of implementing this technology will be less than repeating its traditional, paper-based data collection process. By contracting with industry, the Census Bureau expects to minimize the complexity of data collection automation.

The FDCA Program consists of automated resources for supporting Decennial Census field data collection operations. The scope of the FDCA Program may be amended in response to changing legislative guidance, executive oversight, or Department of Commerce guidance. The Census Bureau is considering seeking a contract for performance of the services (not including field staff) and provision of the hardware and software discussed in subsequent sections of this document.

The role of the Census Bureau and the temporary field office staff is to design, plan, train, and manage field data collection operations. The role of the FDCA contractor will be to provide an integrated solution that enables the Census Bureau and the field office staff by providing the IT infrastructure, software applications and tools, training materials, and support for that infrastructure.

3. FDCA Program Scope

The FDCA Program consists of five major interrelated elements:

- Field Systems Integration and Services Management
- Data Collection and Administrative Software Applications
- Field Office Automation Equipment
- Mobile Computing Equipment (MCE)
- Automation Support Services.

Figure 2 illustrates the scope of the FDCA Program. The FDCA Program supports the Census Bureau field infrastructure and also interfaces with several entities that are external to the program. The field infrastructure consists of:

- Twelve temporary Regional Census Centers (RCC) set up to manage field data collection for their specific region and Local Census Offices (LCO) within their region.
- Approximately 455 LCOs that contain management and clerical staff who oversee and support the census field data collection process within a subset of their Region, such as a state, a group of counties, or a portion of a metropolitan area.
- At peak, approximately 3,300 Field Operations Supervisors (FOS) and approximately 43,000 crew leaders (CL) and CL assistants to manage the enumeration of groups of census blocks within their LCO jurisdiction. The Census Bureau forms crews of enumerators whose work is managed by a CL and supported by a CL assistant. Field Operations Supervisors oversee the work of several crews and are the interface between the LCO and the crews.
- Approximately 425,000 enumerators who are actively engaged in visiting living quarters at peak. These enumerators conduct the bulk of field data collection work. Enumerators are typically hired from within the areas they will work. Most are employed for not more than a few weeks during peak field activity.

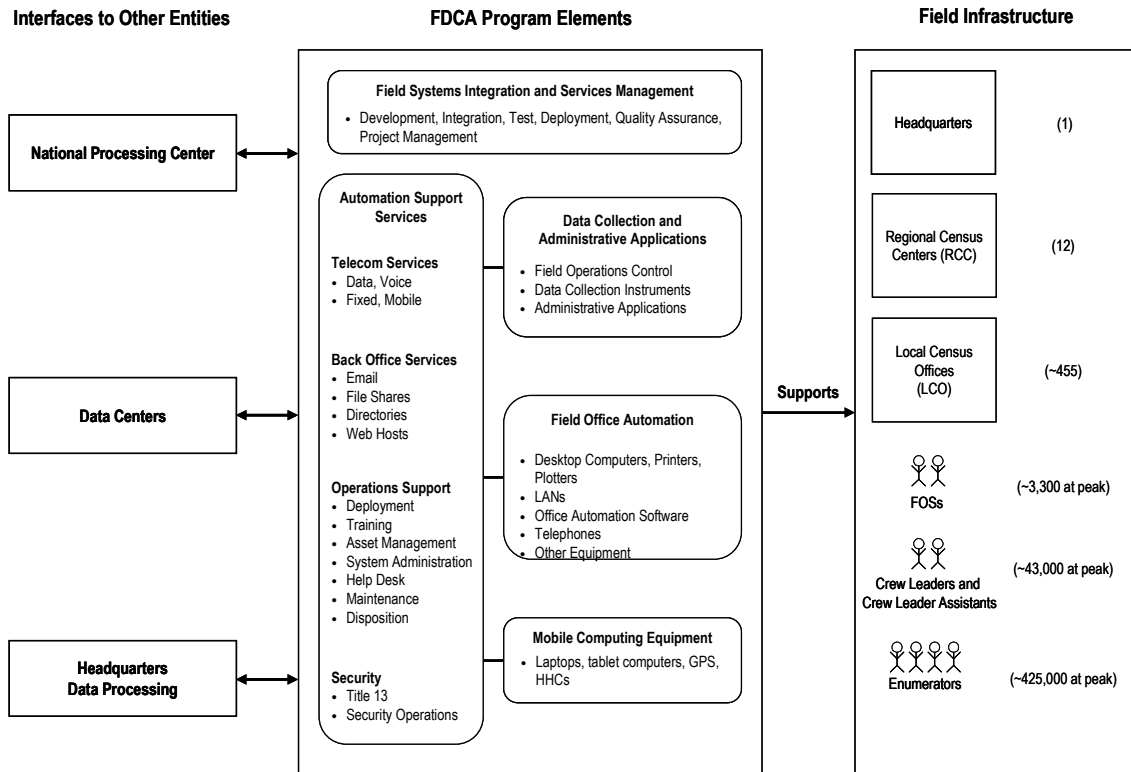


Figure 2. Relationship of FDCA Program Elements to Decennial Census Field Operations Infrastructure

Examples of the other entities with which the FDCA Program may interface include, but are not limited to:

- The **National Processing Center (NPC)**, which is primarily responsible for the processing capability for the production and capture of address and map updates
- The **Data Centers** will consolidate and normalize data from paper, the Internet, telephone and the field
- **Headquarters Data Processing (HQDP)**, which contains the computing resources necessary to analyze census data and run enterprise applications.

The following subsections describe FDCA Program elements that may be included in a FDCA acquisition. The Census Bureau may procure any or all of these services to varying extents.

3.1 Field Systems Integration and Services Management

The FDCA Program must provide an end-to-end system that works seamlessly in a production environment. The Field Systems Integration and Services Management element includes the planning and management activities for the design, development, integration, testing, and deployment of integrated FDCA systems and services. The FDCA Program will provide software applications, field office automation equipment, mobile computing equipment, networking and communications, and automation support. Acceptance testing at multiple stages in the systems development lifecycle will be required to verify satisfactory operation and integration of all hardware and software.

This element includes the management of the Automation Support Services for the FDCA system and the provision of quality assurance services. The Field Systems Integration and Services Management element also must ensure compliance with applicable standards and legislation, e.g., the Americans with Disabilities Act.

3.2 Data Collection and Administrative Software Applications

The Data Collection and Administrative Software Applications element includes the design, development, test, and maintenance of software and interfaces that support field office and mobile field worker activities. Software applications may include, but are not limited to, automated questionnaires, automated address and map updates, time and expense data entry, logistics, and field operations control. This element will also include the design, development, test, and maintenance of interfaces to internal and external systems.

3.3 Field Office Automation

The Field Office Automation element provides the information technology (IT) equipment and software to support field data collection operations required in 12 RCCs, NPC and approximately 455 LCOs. The IT environment may include:

- Desktop computers
- Servers for geographic applications in the RCCs and NPC
- Printers, plotters, and scanners
- Local area networks (LAN)
- Wide area networks (WAN)
- Telephone systems
- Software office automation applications (for example, commercial off the shelf (COTS) /government off the shelf (GOTS))
- Telecommunication equipment
- Middleware
- Operating systems.

All of this IT may be integrated into a standardized operating environment to be proposed by the FDCA contractor. The field office IT environment will be used to host all applications that are required to support operation of the field offices.

3.4 Mobile Computing Equipment

The Mobile Computing Equipment element provides the necessary IT equipment, such as laptops, tablet computers, or hand-held computers, for data collection and administrative functions in the field by FOSs, CLs, and enumerators.

3.5 Automation Support Services

The Automation Support Services element includes four separate services: Telecommunications Services, Back-Office Services, Operations Support, and Security.

3.5.1 Telecommunications Services

Telecommunications Services includes all data, voice, video, and other telephony communications services needed to support Decennial Census field operations. The Data Services portion of this element must provide data communications supporting multiple protocols and classes of service with the option to integrate data and voice traffic. The Voice Services portion will include local, long-distance, and toll-free services. Communications Services will be required to support information flows at approximately 455 fixed locations and may be required for about 500,000 mobile field workers throughout the United States and Puerto Rico at peak. The FDCA Telecommunications Services must interface with existing Census Bureau networks.

3.5.2 Back-Office Services

The Back-Office Services element includes network-based services needed to support Field Office Automation and Data Collection Automation. The Back-Office Services will consist

primarily of electronic mail, file sharing, directory, and website-hosting services. This element may also include the provision of Internet access, Virtual Private Network, extranet, and firewall services.

3.5.3 Operations Support

The Operations Support element includes the deployment, training, asset management, systems and network administration, help desk, maintenance, and disposition services needed to support IT automation deployed in the field. A major component of this element is the integration, packaging, deployment, and management of hardware/software deployed to the field offices, FOSs, CLs, CL assistants, and enumerators throughout the life cycle of the FDCA Program.

3.5.4 Security

The Security element includes the personnel and automated systems for ensuring and verifying compliance with all current security requirements associated with the storage and transmission of data across platforms. These security requirements include the Federal Information Systems Management Act (FISMA), Homeland Security Presidential Directive 12, and National Institute of Standards and Technology (NIST) security standards; Title 13, U.S. Code; and security operations. This element also includes network intrusion detection monitoring, continuity of operations and contingency planning, and security change management for the protection and confidentiality of Census Bureau data.

Note to Appendices

The following Appendices provide additional detail applicable to the Field Data Collection Automation Program. Appendix A, *Field Organization and Operational Management*, describes field infrastructure and common support processes of field operations. Appendix B, *Field Data Collection Processes*, describes field operations to improve address coverage, enumeration processes, and evaluation and experiments that FDCA must support. Appendix C, *General Automation Considerations*, provides a discussion of the issues that apply across the entire FDCA Program.

Appendix A. Field Organization and Operational Management

The U.S. Census Bureau is responsible for planning, conducting, and evaluating the Decennial Census of Population and Housing. The Decennial Management Division (DMD) is responsible for overall program management, including budgeting and scheduling, and the coordination of all other divisions and offices that participate in 2010 Census activities.

The Field Division, under the overall direction of the Associate Director for Field Operations, is responsible for planning, organizing, and deploying the necessary census field organization and infrastructure to support the 2010 Census program. The Field Division Headquarters staff is located in Suitland, MD. Late in the decade (2008/2009), the Field Division will establish an organization of 12 Regional Census Centers (RCC) and hundreds of Local Census Offices (LCO). These temporary offices may open in more than one wave. The temporary Census Bureau field infrastructure covers the entire 50 states, the District of Columbia, and Puerto Rico; employs hundreds of thousands of enumerators and other temporary workers; and administers field data collection and related support programs that account for the largest percentage of the 2010 Census budget.

A.1 Field Infrastructure

The Field Division establishes a temporary national infrastructure to complete decennial field operations. This infrastructure, as shown in Figure 3, is hierarchical and people intensive.

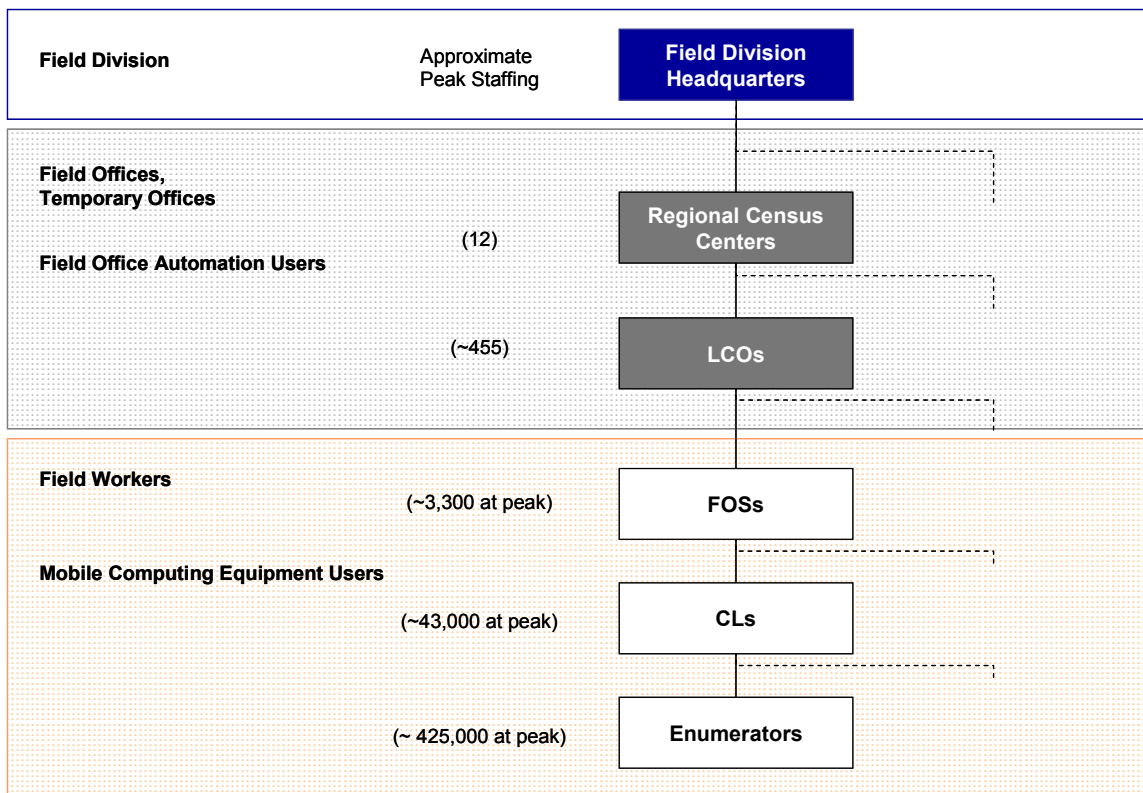


Figure 3. Organization of Field Infrastructure

The following subsections provide a brief description of the roles and responsibilities of the organizational units within the Field Division.

A.1.1 Field Division Headquarters

The Field Division Headquarters is responsible for the overall planning, preparation, and management of field activities supporting decennial data collection and geographic operations. The Field Division's specific duties are to:

- Translate decennial census program requirements, goals, and objectives into plans for implementation in the field
- Provide procedures and training on census operations, and data collection schedules for 2010 Census operations to the field organization
- Provide guidance and support to Regional Directors, Assistant Regional Census Managers, and other managers within the temporary field infrastructure
- Support the development of detailed budgets, cost estimates, staffing requirements, and other resource needs
- Monitor expenses and costs for each field operation
- Manage the operations and activities that support national recruiting and pay rate planning, as well as space management and logistics planning
- Provide procedures, training, and schedules for the field partnership program.

A.1.2 Regional Census Centers

Regional Census Centers are established as temporary offices late in the decade, and are located in or near the same city as our 12 permanent Regional Offices. The permanent Regional Director serves in the top management position in each corresponding RCC. The RCC houses regional management and serves as an administrative, field operations, geographic, and partnership hub for all decennial field activities conducted within the region. The RCCs provide direct oversight and support to approximately 30–50 Local Census Offices.

A RCC conducts the following activities for the duration of the census:

- Managing the field data collection at the regional level
- Recruiting management staff for the RCC and its associated LCOs
- Printing maps
- Monitoring and providing direction and support to associated LCOs.

Schedule

Event	Time Frame
Dress Rehearsal	January 2007 (RCCs open, if necessary)
2010 Census	January 2008 (RCCs open) 2011 (RCCs close)

Order of Magnitude

For the 2010 Census:

- 100–130 staff per RCC.

A.1.3 Local Census Office

The Local Census Office provides local support for every aspect of 2010 Census field activity within a defined geographic area. LCOs manage address coverage and enumeration operations, as well as recruiting, hiring, staffing, payroll, training, partnership, communications, and other administrative or support activities.

Many factors interact to make LCO management complex, challenging, and intense. Individual decennial census field operations are generally short in duration, lasting from one day to 10 weeks. Some operations are sequential; others proceed in parallel. It is critical that the LCOs closely monitor cost, progress, quality and the overall operational schedule. Turnover in the field and at LCOs can be as high as 100 percent or more.

LCO workloads vary depending on the region and operation; average Non-response Followup workloads (the largest operation) are between 75,000–150,000 housing units. Each LCO hires approximately 1,000 enumerators. The typical LCO has about 25 people working at a given time. During peak operations, LCOs maintain a minimum of two shifts and may operate around the clock when necessary.

The LCO is tasked with the following local activities for the duration of the census:

- Printing address listings and maps for paper-based operations
- Recruiting, hiring, and training, for qualified employees to work in the LCO and in the field
- Keying administrative and operational data for paper-based operations
- Tracking office assets
- Providing operational and procedural direction and support to all field staff within its defined geographic area.

Schedule

Event	Time Frame
Dress Rehearsal	January 2007 (offices open)
2010 Census	January 2009 (begin opening offices) December 2010 (all offices close)

A.1.4 Field Workers

The field workers are mobile workers who work out of their house and generally do not use field office facilities. The field workers consist of the Field Operations Supervisors (FOSs), Crew Leaders (CLs), and enumerators. They are tasked with the following activities for the duration of the census:

- Field Operations Supervisor (FOS)
 - Serves as second-line field supervisor to enumerators
 - Trains and supervises assigned CLs
 - Provides operational support
 - Reviews the status of crew leaders' work and quality measures, approves their payroll, and manages assignments
 - Each FOS typically supervises approximately eight crews.
- Crew Leader (CL)
 - Serves as first-line field supervisor to enumerators
 - Trains and supervises assigned enumerators
 - Provides operational support
 - Meets with enumerators on a daily basis, reviews the status of their work and quality measures, approves their payroll, and manages assignments
 - Supervises at least one CL assistant to help train and supervise enumerators
 - Each CL typically supervises a crew of 12 to 16 enumerators.
- Enumerators
 - Conducts canvassing to update address lists and maps
 - Conducts interviews with respondents to collect data.

Automation Considerations

Given the temporary nature of the field organization, it is imperative to open and operationalize RCCs and LCOs as quickly as possible. In the case of the LCOs, many regions have a limited window between space acceptance, the completion of initial recruiting/ hiring/training processes, and the kickoff of actual field operations. Given these needs, it is crucial that the LCO's information technology (IT) infrastructure (telecommunication, systems, and applications) is proven, stable, easy to install, capable of performing to expected loads, and capable of operating 24x7 within the space leased by the Census Bureau. The FDCA contractor does the installation of the IT infrastructure; Census Bureau field staff is not responsible.

A.2 Common Support Processes of Field Operations

Subsections A.2.1–A.2.6 describe six common support processes that enable and support each of the Decennial Census field operations. These common support processes are fundamental to the field organization: the failure to successfully execute any of these processes adds significant risk to the field organization's ability to complete its mission. Since these support processes are interrelated, they require integration with one another (and also, in some cases, with external processes or systems) to support field management in the large-scale, time-sensitive, and people-intensive mission of the Decennial Census.

The common support processes of the Decennial Census field data collection operations are:

- Communication
- Field Operations Control
- Administrative Control
- Quality Control
- Training
- Logistics Management.

The following subsections present an overview and automation considerations, as appropriate, for each common support process.

A.2.1 Communication

Process Overview

The *Communication* process includes all activities and functionality that enable or support interactions among different levels of the temporary field infrastructure, and between Field Data Collection Automation (FDCA) modules or applications and other systems. The line of communications (reporting relationships) for census field operations is hierarchical. The field data collection business processes (See Appendix B) require information flows among at least the following locations, entities, groups, and systems:

- Census Bureau Headquarters (Suitland, MD)

- Census Computer Center (Bowie, MD)
- National Processing Center (NPC) (Jeffersonville, IN)
- Data Centers—locations TBD by Decennial Response Integration System (DRIS) contract
- 12 Regional Offices—current locations
- 12 Regional Census Centers—in or near Regional Office cities
- Puerto Rico Area Office—location TBD
- ~Approximately 455 Local Census Offices
- ~3,300 FOSs (at peak) and approximately 43,000 crew leaders and crew leader assistants (at peak)—mobile locations
- ~425,000 enumerators (at peak)—mobile locations
- Other mobile users
- Other Census Bureau systems (e.g., Decennial Applicant Payroll and Processing System (DAPPS))
- Other agencies/external systems—various locations.

Information flows between fixed locations will include voice and data. Information flows to/from mobile workers will include only data.

Robust communications capabilities are absolutely essential in a nationwide, distributed organization and architecture. These communication capabilities will provide requirements, direction, and support to field offices and other locations (including mobile users). This will facilitate:

- Large-scale, nationwide recruiting activities
- Assignment and receipt of cases (interface with data centers)
- Transmission and receipt of completed cases and associated address and/or Census data (within field infrastructure)
- Reporting of cost, progress, and related information
- Monitoring and control of field data collection operations
- Timely decision making (e.g., reassignment of work, reallocation of resources) at all levels of the field organization.

Automation Considerations

- Preserving both the basic, hierarchical field communication flow (that is, involving FOSs/CLs) and positive control of assignments within a mobile computing environment, especially in situations where CLs might wish to reassign work from Enumerator A to Enumerator B in the field. Subsections A.2.2, *Field Operations Control* and B.1.2, *Nonresponse Followup (NRFU) / Vacant/Delete Check* present related considerations.
- Designing and scaling a telecommunications environment that supports at a minimum daily transmissions to and from about 500,000 mobile delivery points (at peak)
- Maintaining required levels of security, and the confidentiality of all data protected by Title 13, U.S. Code (see also section C.1)
- Defining the network characteristics (for example, transmission and error rates), which will guarantee the level of network performance (known as quality of service) for all voice communications, data transmissions, and information flows.

A.2.2 Field Operations Control

Process Overview

Field Operations Control is the process for managing, monitoring, and controlling every data collection process in the field. Each level of management within the field organization uses a set of tools to manage and monitor its portion of the data collection universe (workload) assigned to the field. The *Field Operations Control* process tracks every assignment listing, map, and questionnaire in the workload universe from the beginning to the end of a field operation. At the conclusion of a field operation, everything must be completed, accounted for, and tracked to disposition in appropriate office or organization outside the FDCA Program for subsequent handling.

In theory, the *Field Operations Control* process is a simple one: to maintain positive control of data collection operations. This involves importing the universe of addresses and data about addresses from Headquarters (HQ) systems or DRIS, assigning work to field staff, checking in work and case status from the field, recording/maintaining status and other data (such as population count for individual housing units), recording daily cost and progress, reassigning work when needed, and ensuring that all data collection efforts are completed within scheduled deadlines.

In practice, however, the *Field Operations Control* process is quite complex. It is managed by a temporary workforce, and typically has high turnover of staff. Each data collection activity has a short duration; the volume of work is large and must be produced within tight deadlines. This process will consist of making both an automated process involving generation of assignments based on specific size, status information, and geographic criteria, as well as a “clerical/hands-on” capability to make assignments. To cope with the volume of work, there are high workload reassignment rates, and the process demands flexibility to accommodate special enumeration procedures. Field operations control implementation, therefore, must be easy to learn and use.

Moreover, field operations control information will be integrated with a variety of other data (e.g., payroll, quality control, etc.). This integration will provide managers at all levels with a global view of the current status, cost, and quality of operations and enable them to make timely and information-based decisions.

The *Field Operations Control* process is used by all levels of the field staff during data collection activities. Enumerators use the process to manage their workload. Crew leaders use it to review status and quality of the enumerators' work, the enumerator's productivity, and to make reassignments when necessary. FOSs use the process for managing and monitoring CL progress and to make necessary staffing adjustments. LCO management uses the *Field Operations Control* process to provide oversight for all data collection and quality control activities, and to review and take action on special or outlier (exceptions) cases. HQ and RCC management also use the process to monitor the progress of the LCOs, and to provide oversight for all data collection and quality control activities across the region.

Automation Considerations

Field operations control is a critical component of the FDCA Program that the FDCA contractor will provide. Field operations control must exist for all field data collection operations described in Appendix B regardless of whether the data are collected with mobile computing equipment (MCE) or with paper forms. More specifically, an *automated* field operations control is essential for both electronic and paper-based field data collection operations. Field operations control must also accommodate simultaneous (but distinct) operations such as NRFU and Vacant/Delete (see subsection B.1.2), and the notion that more than one field worker may be able to work and status the same case at the same time.

Headquarter, RCC and LCO management require near real-time data (i.e., current within 24 hours or less) to make necessary staffing/operational adjustments. LCO staff may access field operations control information on a 24x7 basis at peak. Field staff (FOSs/CLs) will require access to report data in paper or electronic form. Accessibility, security, and performance are all critical success factors for the implementation of automation support for field operations control.

Field operations control and its implementation must provide an effective and efficient mechanism for the field organization to complete its mission. The effectiveness and efficiency of the field controls will directly contribute to the management of operations to a successful completion, including on schedule, within cost, and meeting quality requirements. Field operations control must provide for the continual flow of work to and from the field, maintain accurate and near real-time information, and make available integrated and timely status and cost reports to all levels of management.

Field operations control also must maintain a robust reporting capability (including graphics) for all levels of management. Although a variety of canned reports (many taking the form of exception lists or outlier reports) are used to monitor field activities, a significant ad hoc reporting capability will also be required. Reports from integrated data (e.g., field operations control, payroll and personnel) must clearly identify the source and timeliness of the data.

A.2.3 Administrative Control

The Administrative Control Support Process includes an array of interrelated business processes, including Recruiting and Testing, and Decennial Applicant, Personnel and Payroll Operations.

A.2.3.1 Recruiting and Testing Process

Process Overview

The *Recruiting and Testing* process facilitates the Census Bureau's recruiting and testing of applicants for a wide range of positions. There are two basic types of tests—management and non-management—and each must be available in English and Spanish. This process requires a large-scale, nationwide recruiting effort, supported by extensive advertising and promotion. From the beginning of Dress Rehearsal through the 2010 Census, the Census Bureau plans to recruit 3.5 million people, hire 1 million of them, and pay about 500,000 field workers at peak operations. Every job applicant must submit an application, pass a written test, and meet certain other requirements before being hired as a census worker. The Census Bureau also conducts security screening of all applicants.

Automation Considerations

- Provide a national toll-free recruiting and call-routing service, and interactive voice response (IVR) system, to assist with the recruiting/testing process.
- Disseminate jobs information electronically
- Ensure the LCOs/RCCs have adequate telephone capacity to handle recruiting activities.

If fiscally advantageous, the Census Bureau will consider allowing applicants to complete and submit employment applications and self-schedule for testing via the Internet.

A.2.3.2 Decennial Applicant, Personnel and Payroll Operations

Process Overview

The Census Bureau has developed the Decennial Applicant, Personnel and Payroll System (DAPPS) operations to support the selection, hiring, and payroll of short-term employees. This system supports the four subcomponents of this process: front-end data capture, job application processing, personnel processing, and payroll processing described below.

- The ***front-end data capture*** subcomponent reflects electronic capture of all government forms used in the applicant, personnel, and payroll processes, and of electronic signatures where required for payroll certification/approval; time and expense reporting capabilities on the HHC will be provided by the FDCA contractor. See Automation Considerations.
- ***Job application processing*** reflects the production of selection certificates.

- **Personnel processing** involves recording all valid personnel actions, such as hiring and termination. It also includes changes to employee data, such as name or address, or changes in job data (e.g., pay rate or position). Dates are associated with each action, and a history of all personnel actions is maintained.
- **Payroll processing** involves generating a weekly payroll. Varying tax laws, locality pay distribution, cost of living adjustments, and overtime pay limits add complexity to the processing. Employee pay must be calculated employing federal, state, and local tax guidelines. Employee-specified tax withholdings, garnishments, and other deductions, direct deposits, and retroactive pay must be available. Quarterly balances or employee earnings and taxes must be maintained.

The FDCA Program will provide only the functions described in Automation Considerations.

Automation Considerations

- Provide field workers with ability to report and submit time and expense data (including management approvals) electronically during Address Canvassing, Nonresponse Followup and Census Coverage Measurement Person Interview operations
- Interface with Decennial Applicant Personnel and Payroll System (DAPPS) to allow office staff to key in time and expenses reported by field and office workers using paper-based data collection processes
- Provide Headquarters, RCC and LCO management with data critical to monitoring progress and cost of Census field operations in near real time based on daily payroll submissions
- Provide and maintain the hardware to run the DAPPS applications.

A.2.4 Quality Control

Process Overview

The *Quality Control* process (sometimes called the *Reinterview* process) involves re-checking a sample of completed work performed by an individual and rectifying the unit of work represented by that sample if significant problems are detected. The goal of quality control (QC) is to (1) deter and detect data falsification and overt violation of important data collection rules and procedures, and (2) to identify and rectify poorly done batches of work on a timely basis to minimize the number of cases requiring reassignment for rework. Every address list update and field data collection operation includes the timely and concurrent validation of the quality of the data collected and/or work performed and, as necessary, the prompt correction of errors. A separate QC staff for most operations conducts QC activities. Approximately 5 to 10 percent of the work is sampled for QC. The QC results provide managers and supervisors with information that can be used to retrain or counsel employees to improve job performance and to detect and substantiate instances of data falsification that would lead to the termination of the employee. The earlier errors and falsifications are identified and addressed, the fewer the number of assignments that must be reworked.

Automation Considerations

Quality control normally requires access to the original work to determine that it was completed, the nature of the outcome, and to access information from the specific completed interview or address updating activity. QC is time sensitive: it must be done as quickly as possible, which requires expeditious capture and transfer of information from the production process to QC and then quick identification and rechecking of the sample of work.

Timely, complete, and accurate documentation and recordkeeping of results is critical to support decisions involving rework, to support administrative actions that could result in an employee being counseled or released, and to assure that QC is progressing effectively and on schedule. Timely and up-to-date reports must be available at all levels of the field organization.

Quality control will use management methods and automated tools similar to those used by production but adapted for QC needs (e.g., automated questionnaires, supervisory tools, case management, and cost, performance, and progress tracking). QC applications may have to interface with government-off-the-shelf (GOTS) software. QC will also need some additional tools for communicating results that could lead to rework or employee administrative actions.

A.2.5 Training

Process Overview

The *Training* process covers the training of field and office staff. This process includes identifying the major duties, instructing staff on procedures to carry out those duties, and training staff on the tools they will use to do their job. The training includes all aspects related to the job, including administrative tasks (such as completing personnel and payroll forms), understanding the purpose of the Decennial Census and the responsibility to protect the confidentiality of the data, how to use the tools (such as mobile computing equipment to collect and report data), and how to conduct an interview. For those in supervisory positions, the training includes the additional roles and responsibilities of the position, such as payroll certification, and reviewing and managing the work of their subordinates. For office employees, training covers use of automated field control tools and performance of administrative processes, etc. Given the extensive use of technology to enable both office and field operations, training also includes automation functionality and the processes applicable to a particular job and operation.

Training for field operations is hierarchical. Regional Census Center staff train LCO managers. LCO managers train the FOSs, who in turn train the CLs. The CLs then train the enumerators who will perform the majority of the field work. Verbatim training packages are provided to ensure that the training is consistent across all training sessions.

Automation Considerations

- Provide automated training tools and materials that describe how to use the office and mobile computing equipment assigned to office staff and field workers
- Provide automated training and materials that describe the software functions that office staff and field workers are expected to use to complete their work during operations

- Provide office staff and field workers with an environment that allows them to simulate operational scenarios during and after training.

A.2.6 Logistics Management

Process Overview

The *Logistics Management* process involves coordinating IT and telecommunications installation, and equipment delivery activities. Regional management is responsible for the oversight and coordination of opening 12 RCCs and approximately 455 LCOs. Each Region may be responsible for coordinating the provisioning of 30–50 LCOs. In addition, *Logistics Management* may involve coordination with a number of different partners, vendors, or suppliers—e.g., General Services Administration (GSA), furniture suppliers, physical security vendors. The Bureau of the Census and the FDCA contract managers also need to be kept abreast of the status of every component related to opening the LCO.

The FDCA contractor oversees the IT asset management processes. This involves controlling and tracking through the life cycle the sequence of events for ordering and dispersing inventory, managing purchases, managing the assembly of IT packages, managing the staging and shipment of the property to the offices, controlling re-supply, and managing property disposal at the conclusion of the census. Lost or stolen property must be reported and documented.

The Census Bureau also must have the capability to redeploy MCE from one field operation to the next. Therefore, retrieval, data cleansing, software re-imaging, and redeployment of IT equipment may be necessary.

Automation Considerations

The FDCA contractor must manage all software and hardware provided as part of the contract. Unique challenges associated with the *Logistics Management* process include:

- Provide managers with a collection of automated tools that will provide the necessary information to ensure the timely and efficient delivery of all property (including accountable property/IT equipment) provided by the FDCA Program
- Provide interfaces with internal and external (e.g., GSA) logistics management systems
- Provide a maintenance/repair/hot swap and/or spare parts capability.

Appendix B. Field Data Collection Processes

The 2010 Census Field Data Collection consists of three types of inter-related processes: field operations to improve address coverage, enumeration processes, and evaluations and experiments.

Field Operations to Improve Address Coverage

The Census Bureau compiles the Master Address File (MAF) /Topologically Integrated Geographic Encoding and Referencing System (TIGER) database that contains the list of all known locations where people live that must be included in the census. The accuracy of the MAF/TIGER database is critical to the success of the Decennial Census because it is used to guide the enumeration processes. MAF/TIGER must “cover” or contain accurate information about as many of the actual places where people live in the country as possible. It must also contain accurate geographic information for such map features as roads and rivers that are used to define counting areas and to help enumerators navigate to locations during the enumeration processes.

The MAF/TIGER is continually updated by integrating such sources as United States Postal Service (USPS) delivery point address lists, Census Bureau and current survey field operations, and inputs from government organizations. To achieve the desired level of coverage, field operations are conducted to validate and update the MAF/TIGER just prior to the actual enumeration.

The specific processes to improve address coverage are:

- Address Canvassing
- Group Quarters Validation
- Update/Leave
- Field Verification.

Enumeration Processes

Several 2010 Census Field Data Collection business processes are used to complete census data collection while updating the MAF, collecting data for housing units that did not respond, or following up to improve coverage and quality. These processes include:

- Update/Enumerate
- Remote Alaska Enumeration
- Enumeration of Hotels and Motels
- Transient Night (T-Night)
- Nonresponse Followup / Vacant/Delete Check
- Special Place/Group Quarters Advance Visit

- Group Quarters Enumeration
- Service-Based Enumeration
- Military Advance Visit
- Military Group Quarters Enumeration
- Be Counted

Evaluations and Experiments

- Census Coverage Measurement
- Other Evaluation and Experiment Processes

The following sections provide a description of each process including a *Process Overview* that delineates the main purpose, actions, and relevant actors for the process; a *Schedule* that identifies relevant events and dates; an *Order of Magnitude* that establishes the scale of the effort by the size of the workload; and a set of *Automation Concerns* relevant to providing automation support for specific field data collection processes.

B.1 Operations Using Mobile Computing Equipment for Field Data Collection

After analyzing the anticipated cost, risks and benefits, the Census Bureau currently plans to limit the scope of mobile computing equipment use to the following processes for field data collection:

- Address Canvassing / Delete Check
- Nonresponse Followup / Vacant/Delete Check
- Census Coverage Measurement Person Interview

The scope of mobile computing use in field data collection processes is subject to change pending further Government analyses.

B.1.1 Address Canvassing (AC) / AC Delete Check

Process Overview

Address Canvassing (AC)

Address Canvassing (AC) is a field operation for verifying and correcting addresses for all living quarters and street features shown on the listings and maps produced from the Decennial Census extract of the MAF/TIGER. It is a dependent field operation that requires the listers to compare what is on the ground to what is on the MAF/TIGER. The field listers will verify existing living quarters, identify duplicates on the address list, add new living quarters that are not on the address list, identify duplicates on the list, and delete from the address list living quarters that do

not exist on the ground. They will also capture GPS coordinates for every structure containing living quarters. The goal of this operation is to ensure the accuracy and completeness of the Census Bureau address file and spatial database used to control and facilitate the delivery of census questionnaires.

Listers will knock on every door to attempt to contact respondents to verify address information as well as inquire about any additional living quarters. They will compare the information to what is on their lists and maps and make the required changes. They will add any addresses that are on the ground but missing from the address list. They will delete any addresses that are on the list but are not found on the ground. They will make changes to existing addresses, such as changing an apartment number, if necessary. The listers will collect a map coordinate for every structure that contains a living quarter. In addition, they will classify all living quarters as “housing units” or “other living quarters.” “Other living quarters” are living quarters that are not conventional housing units, but are such places as college dormitories, prisons, skilled nursing facilities, and the like. The listers will make the appropriate changes to the maps. This will include adding new street features that are not on the maps, deleting street features that are not on the ground, and correcting street features, such as correcting the street name. All map and address updates from Address Canvassing will be used to update the MAF/TIGER database for later Census Bureau operations.

The correct classification of “other living quarters” will be determined during a subsequent field operation called Group Quarters Validation.

AC Delete Check

The *AC Delete Check* process will verify the accuracy of the status of housing units identified during Address Canvassing as delete. The lister determines the housing unit status and updates the status of the housing unit, if necessary.

Schedule

Event	Time Frame
Dress Rehearsal	April 9, 2007 – May 22, 2007
2010 Census	April 6, 2009 – May 16, 2009

Order of Magnitude

For 2010 Census:

- AC – ~130,000,000 living quarters
- AC Delete Check – ~6,000,000 living quarters

Automation Considerations

- Conduct Address Canvassing and Delete Check concurrently

- Collect accurate latitude and longitude using GPS for all structures (within 3 meters) and map features (within 7.6 meters)
- Capture address list updates (including verifications, additions, deletions, and modifications) electronically
- Capture map features updates (including, additions, deletions, and modifications) electronically
- Ensure address list updates correspond with map updates, and vice versa
- Identify type of living quarters
- Eliminate the need for paper maps and address lists for field listers.

Concept of Operation

The LCOs will create and maintain crew leader assignment areas and address lists using the field operations control process. Assignment and address data from the field operations control process will stem from MAF/TIGER and data collected by field workers. During the operation, field workers will use MCE to perform the following functions:

- **Global Positioning System (GPS) Collect for Structures:** provides the ability to capture GPS coordinates for all structures that contain living quarters in their assignment area.
- **Address List Update / Assignment Management with “Adds” and “Deletes”:** provides the ability to report descriptive information about the living quarters on their address list (such as its appearance, the type of living quarters, and whether it is vacant), add living quarters records that are not already on the list (i.e., “adds”), and mark for deletion records on the assignment lists that cannot be located or that are not living quarters (“deletes”).
- **“Delete” Check:** provides the ability to reassign and verify the status of “delete” check cases.
- **Payroll Input:** provides the ability to enter and submit work hours and expenses on a daily basis. This function provides crew leaders with the ability to review, approve and certify the work hours and expenses submitted by the lister on a daily basis, and to submit crew leader approvals on a daily basis.
- **Map Display and You Are Here Indicator:** provides the ability to view map features, the locations of structures on their address lists, and their current location of the field worker at by way of GPS readings. Field workers will be able to pan and zoom the map display to highlight details of interest.
- **Map Update:** provides the ability to annotate maps with new features and housing unit map spots, and to delete or relocate erroneous features or map spots.

On a daily basis, crew leaders will meet face-to-face with their listers to discuss the status and any issues associated with lister assignments. Before, during or after these meetings, they will use their MCE to review and approve work hours and expenses submitted by the listers.

Work hours and expenses entered on field worker MCE will be transmitted to a central Census location on at least a daily basis. All other data entered on the MCE will be transmitted at the end of a field worker's assignment. After listers complete all of their assignments, they will return their MCE to their crew leaders, who will send the MCE to the appropriate LCOs.

The field operations control process will create assignments to check addresses marked as a "delete" by a field worker. It will also update the address lists for each assignment area throughout the operation based on "adds" and confirmed "deletes" reported by field workers.

Depending on the solution proposed by the FDCA contractor, re-imaging, reconfiguring and redeploying the MCE from AC for use during NRFU may be necessary.

B.1.2 Nonresponse Followup / Vacant/Delete Check

Process Overview

For the 2010 Census, the NRFU and Vacant/Delete Check processes will be conducted during the same period.

Nonresponse Followup

The *Nonresponse Followup* process is conducted to obtain completed questionnaires from housing units for which the Census Bureau did not receive the household's census data through a questionnaire returned by mail or completed through the Internet or telephone interview.

During NRFU, the enumerator is given a list of addresses for housing units to visit, a map showing the locations of the housing units, and the questionnaire to collect data from household respondents. The enumerator completes a questionnaire for each housing unit assigned to him/her whether or not the housing unit is occupied on Census Day. The enumerator may capture or verify GPS coordinates for the structure. Questionnaires are reviewed and those failing review may be re-assigned for completion/resolution.

The NRFU universe fluctuates up and down constantly while the operation is in progress, reflecting mail returns received after the start of the operation, questionnaires received, but later determined to have no data, and new housing units discovered during NRFU or in previous operations. These fluctuations must be reflected in the enumerator assignments each day to ensure that data collection can be completed within the very ambitious schedule.

Special procedures are used in specific areas during the NRFU operation or under specific conditions in order to accomplish the enumeration. These special procedures include:

- **Blitz enumeration.** In blitz enumeration, a crew of enumerators conducts NRFU on a compressed time schedule in specific areas with outstanding workloads. The objective is

to establish a large census presence (particularly in hard-to-enumerate apartment buildings) and to complete large case loads in one massive sweep.

- **Local facilitators.** By engaging community activists, religious leaders, and other recognized local figures, the CLs facilitate the completion of NRFU.
- **Paired enumeration.** When safety reasons dictate, enumerators are paired together.

Vacant/Delete Check

The *Vacant/Delete Check* is a process to conduct an independent check on the status of housing units identified in NRFU as vacant or delete. The enumerator assigned a vacant/delete check case does not know its previous status determination from NRFU. The enumerator contacts the housing unit to make this independent determination of its status on Census Day and completes a census questionnaire.

Schedule

Event	Time Frame
Dress Rehearsal	April 26, 2008 – July 19, 2008
2010 Census	April – July 2010

Order of Magnitude

For the 2010 Census:

- NRFU – 39,000,000 housing units
- Vacant/Delete Check – 7,000,000 housing units

Automation Considerations

- Conduct NRFU/ Vacant/Delete Check concurrently
- Collect census questionnaire data
- Collect accurate latitude and longitude using GPS for all residential structures added during the operation (within 3 meters) and map features (within 7.6 meters)
- Deploy about 500,000 pieces of mobile computing equipment across the entire country to support this operation.

Concept of Operation

The LCOs will create and maintain crew leader assignment lists based on the NRFU universe maintained by the field operations control process. The field operations control process will update the NRFU assignments throughout the operation based on late mail returns it receives

from DRIS, cases reported as an “add” by field workers, and confirmed “vacants” and “deletes”. The field operations control process will also create assignments to check addresses marked as “vacant” or “delete” by a field worker.

Crew leaders will use their MCE to create and maintain enumerator assignment lists based on their crew leader assignment lists. On a daily basis, crew leaders will meet face-to-face with their enumerators to discuss the status and any issues associated with enumerator assignments. During these meetings, they will use their MCE to review and approve work hours and expenses submitted by enumerators.

During the operation, field workers will use MCE to perform the following functions:

- **Data Collection:** provides the scripts for conducting short-form interviews and the ability to capture short-form data from respondents.
- **Assignment Management with “Adds” and “Deletes”:** provides the ability to add and delete cases on an enumerator’s assignment list. Field workers will add a case and record address information whenever they encountered a housing unit in the field that is not on the block address list. Field workers will mark a case for deletion if, for example, a housing unit or map spot at the designated address cannot be found, or if the structure at that location is not a housing unit.
- **“Vacant”/ “Delete” Check:** provides the ability to report the identification of vacant or deleted housing units, and to report the status of “vacant”/“delete” check cases.
- **GPS Collect for “Adds”:** provides the ability to capture GPS coordinates for new housing units identified while in the field (i.e., “adds”) during NRFU.
- **Payroll Input:** provides the ability to enter and submit work hours and expenses on a daily basis. This function will also provide crew leaders with the ability to review, approve, and certify the work hours and expenses submitted by the enumerators on a daily basis, and submit crew leader approvals on a daily basis.
- **Map Display and You Are Here Indicator:** provides the ability to view map features, the locations of housing units from their assignment lists, and their current location at by way of GPS readings. Field workers will be able to pan and scale the maps to highlight details of interest. Field workers will not have the ability to annotate maps during the NRFU operation.

All data entered on field worker MCE will be transmitted to a central Census location on a daily basis. After the enumerators complete all of their assignments, they will return their MCE to their crew leaders, who will send the MCE to the LCOs. The MCE will be checked in at the LCOs as they are received. Depending on the solution provided by the FDCA contractor, the MCE may be re-imaged and redeployed as necessary during NRFU. At the end of NRFU, the MCE will be disposed or deployed for Census Coverage Measurement Person Interview as appropriate.

B.1.3 Census Coverage Measurement

Process Overview

The Census Bureau will conduct the Census Coverage Measurement (CCM) evaluation program to measure the completeness and accuracy of its enumeration of persons and living quarters in the 2010 Census. Using a nationwide sample in all 50 states, the District of Columbia, and Puerto Rico, the CCM consists of an independent re-enumeration of somewhat less than 0.5% of the living quarters and persons associated with those living quarters. A key feature of the CCM is the notion of its “independence” from the rest of census data collection. This independence dictates certain requirements in managing the CCM and the automated systems supporting that management. For example, the Census Bureau anticipates that coverage measurement field operations will be managed from the RCCs. This configuration will necessitate special arrangements to ensure the independence of the coverage measurement interviews.

For the 2010 CCM effort, a sample of geographic areas composed of one or more contiguous census blocks is selected at headquarters. Field staff visit and identify all living quarters in those geographic areas (the Independent Listing). This independent list of living quarters is compared to corresponding addresses in the census (by computer matching augmented by clerical review). Discrepancies are identified and revisited to obtain more information to resolve them (the Living Quarters Followup), which may be done in two phases. Then, field staff contacts the list of sample coverage measurement addresses and independently enumerate the persons associated with these addresses (the Person Interview).

The Person Interview, which is part of FDCA, is carried out in two phases, first by telephone for selected eligible addresses from which the census had received by mail a completed questionnaire (which included the housing unit’s phone number) or the Internet. The telephone phase is conducted concurrently with NRFU enumeration.

At the conclusion of NRFU and/or update/enumerate in each LCO, CCM field staff visit and interview in person the remaining CCM sample addresses that were not yet completed by telephone and interviewed (the personal visit phase of Person Interview). This enumeration of independently enumerated persons is compared to the census (matched—by computer and, for the nonmatches, by clerks in the NPC and some discrepancies are identified for another visit (the Person Followup) by CCM field staff to obtain additional information. All of this information is used to ascertain if the people interviewed in the Person Interview were found in the census at their right (Census Day) address and if the people enumerated in the census were enumerated correctly or were erroneous census enumerations.

Both phases of Person Interview are performed by field staff and are within the scope of the FDCA Program. Field staff conducting each of these operations will use portable computers (laptop or hand held). These computers will have functionality similar to those used by NRFU enumerators, such as an automated questionnaire, GPS, automated capture of payroll data, and electronic maps. The questionnaire will be substantially different and more complex than the one used for NRFU. The sampling and comparing (matching) of CCM information to the census, including using additional information obtained during the CCM field followup visits to

ascertain correct or erroneous enumeration, is not done by the field and is outside the scope of the FDCA.

Many management activities for CCM, such as payroll and assignment management, will be integrated with other census systems, ensuring that independent interviews are necessary for the coverage measurement survey.

Although all other CCM data collection operations—Independent Listing, Living Quarters Followup, Person Followup, and Final Living Quarters Followup—are performed by field staff, the Census Bureau does not plan to issue MCE to the field staff conducting these operations. The FDCA Program does however provide the Field Operations Control for these paper-based data collection activities.

Schedule

Event	Time Frame
2006 Dress Rehearsal Schedule	
Independent Listing	September – December 2007
Living Quarters Followup	February – March 2008
Person Interview – Phone	May – June 2008
Person Interview – Personal Visit	July–October 2008
Person Followup	November 2008 – February 2009
Final Living Quarters Followup	March 2009 – May 2009 (this operation may occur earlier)
2010 Schedule	
Independent Listing	September–December 2009
Living Quarters Followup	February–March 2010
Person Interview – Phone	May–June 2010
Person Interview – Personal Visit	July–October 2010
Person Followup	November 2010– February 2011

Order of Magnitude

- Independent Listing: 10,000–30,000 geographic areas containing from 750,000 to more than 2,000,000 living quarters
- Living Quarters Followup: 60,000–100,000 addresses
- Person Interview (both phases): 315,000 addresses (15,000 in Puerto Rico) with perhaps 20 percent completed by telephone
- Person Followup: 100,000 addresses with one or more persons requiring additional information
- Final Living Quarters Followup: 22,000 housing units.

Automation Concerns

- Successfully automating the Person Interview questionnaire so that it accommodates the complexity required by the measurement methodology but is at the same time usable by field staff
- Successfully integrating the CCM Person Interview operation with the NRFU operation without adversely affecting either set of operations.
- Assuring that various “independence” requirements are met and supported by information or functionality in the automated systems. One example is the tracking of every staff member’s assigned work to assure that those working on CCM are prevented from being subsequently assigned to census operations and potentially biasing census results in sample areas.
- Assuring that field staff do not have access to the census data collected from households by field workers during NRFU.

B.2 Paper-Based Field Data Collection Operations

After analyzing the anticipated cost, risks and benefits, the Census Bureau currently plans to exclude the use of mobile computing equipment from the following field data collection processes:

- Group Quarters Validation
- Field Verification
- Update/Leave
- Update/Enumerate
- Remote Alaska Enumeration
- Enumeration of Hotels and Motels
- Transient Night (T-Night)
- Special Place/Group Quarters Advance Visit
- Group Quarters Enumeration
- Service-Based Enumeration
- Military Advance Visit
- Military Group Quarters Enumeration
- Be Counted
- All other Census Coverage Measurement operations (except Personal Interview)
- Other Evaluation and Experiment Processes

For the above operations, field workers will not use MCE, however field offices will have automation for the processes described in *Appendix A.2. Common Support Processes of Field Operations*.

B.2.1 Group Quarters Validation

Process Overview

This operation is dependent upon the results of Address Canvassing. As described in AC (subsection B.1.1), living quarters that cannot be determined to be housing units are classified as Other Living Quarters (OLQ). Because of different data collection methodologies, it is important to correctly classify the OLQ.

The Group Quarters Validation (GQV) field operation is conducted to determine the correct classification of the OLQ and other additional information. During this operation, listers will visit each identified other living quarters and conduct an interview using the OLQ questionnaire. The lister will use a series of questions to determine if the address is a group quarters (GQ), a housing unit, or not a living quarters, such as a commercial establishment. If the address is determined to be a group quarters (places such as prisons, skilled nursing facilities, and college dormitories), the respondent will be asked a series of additional questions to determine the type of group quarters, and to collect such information as full name of the facility, basic street address, contact name, telephone number, and maximum capacity. If the address is determined to be a housing unit, the lister will indicate the applicable action code for that address on the address listing page. Other action codes apply for non-residential addresses.

Schedule

Event	Time Frame
Dress Rehearsal	August 17, 2007 – September 23, 2007
2010 Census	August 17, 2009 – September 23, 2009

Order of Magnitude

For the 2010 Census:

- 700,000 other living quarters (includes places such as correctional institutions, skilled nursing facilities, college housing, worker dormitories, assisted living facilities, hotels and motels, campgrounds, marinas, hospitals, service locations for people experiencing homelessness, and juvenile institutions)

B.2.2 Update/Leave

Process Overview

The *Update/Leave* process is used in areas where the type of the address does not indicate the location of the housing unit or the delivery point for receiving mail does not ensure that the mail gets to the correct unit (e.g., mailbox banks are broken and mail is left at a central location). There are two components of the *Update/Leave* process: the first is used primarily in rural areas where the addresses for mail delivery are predominantly not house number/street name style and do not indicate the location of the housing unit; the second is used where hand delivery of

questionnaires by enumerators is needed to ensure delivery to the correct housing unit. Both components follow the same basic process but are managed separately for purposes of assignment management and performance and cost tracking.

The *Update/Leave* process depends on the information collected during Address Canvassing. Enumerators will verify existing living quarters, add new living quarters that are not on the address list, correct address information where necessary, delete living quarters from the address list that do not exist on the ground, and link addresses on the address list that are duplicates. For newly added addresses, the enumerator must enter the unique processing identification number for the questionnaire that they address and leave at the housing unit so that the questionnaire can be adequately checked in if the respondent returns it. The enumerator also must map spot the location of the newly added unit to support assigning the address to the correct census block and to aid other field staff who might return to the address for QC, Nonresponse Followup, or other follow-up operations.

Schedule

Event	Time Frame
Dress Rehearsal	March 3–31, 2008
2010 Census	March 1–29, 2010

Order of Magnitude

For 2010 Census:

- ~7,000,000 housing units

B.2.3 Field Verification

Process Overview

The *Field Verification* process verifies addresses entered by respondents on Be Counted forms and requested questionnaires or interviews from Telephone Questionnaire Assistance, for which there is no record on the MAF. Addresses must be assigned to a census block before they can be sent to the *Field Verification* operation.

During the *Field Verification* operation, field staff will verify whether the addresses exist in the block to which they are assigned. If the verifier cannot find the address in the assigned block, verifier will delete the address. If the verifier determines that the address duplicates another address in the assigned block, the verifier will link the address to the address it duplicates. The outcomes of the actions taken by the verifier are then used to update the MAF for inclusion/exclusion in the census. Later, these updates are reflected in the MAF.

Schedule

Event	Time Frame
Dress Rehearsal	July 30, 2008 – August 19, 2008
2010 Census	July 30, 2010 – August 19, 2010

Order of Magnitude

For the 2010 Census:

- ~500,000 address records

B.2.4 Update/Enumerate

Process Overview

The *Update/Enumerate* process is a method of data collection conducted in communities with special enumeration needs and where many housing units may not have house-number-and-street name mailing addresses. This process is very similar to the *Update/Leave* process except that it includes enumeration instead of questionnaire drop-off. Enumerators canvass assignment areas to update residential addresses, including adding living quarters that were not included on the address listing pages, update Census Bureau maps, and complete a questionnaire for each housing unit. This process will be used in such unique areas as American Indian reservations, colonias (small, usually Spanish-speaking communities), and resort areas with high concentrations of seasonally vacant living quarters.

Schedule

Event	Time Frame
Dress Rehearsal	March 17, 2008 – June 2, 2008
2010 Census	March 2010 – June 2010

Order of Magnitude

For the 2010 Census:

- ~1.7 million housing units

B.2.5 Remote Alaska Enumeration

Process Overview

The *Remote Alaska Enumeration* process is unique because of the challenges associated with accessing the communities in remote areas of Alaska. Outlying or remote communities in

Alaska range in population from several to several hundred people. The communities are widely scattered and rarely linked by roads. Most of these communities throughout the state are accessible only by small-engine airplane, snowmobile, four-wheel-drive vehicle, dogsled, or some combination thereof. Due to the sequential timing of the spring thaw (or “breakup” as it is known locally) across Alaska, enumeration of the remote areas begins in late January. The earlier timing for *Remote Enumeration* permits travel to these areas when conditions are most favorable. For example, the ground and rivers are still frozen so planes can fly in and out when residents are still at home. Once the spring thaw begins, travel to some of these areas becomes difficult or impossible, and the residents leave home to fish and hunt. Enumerators must finish their work before then, or they miss a large part of the population.

Enumeration for this area is managed by a single LCO and is conducted in three waves using modified stateside *Update/Enumerate* procedures. Despite the earlier start time for this region of the country, all census questions are asked in relation to Census Day (April 1).

Schedule

Event	Time Frame
Dress Rehearsal	Not conducted
2010 Census	January – March 2010

Order of Magnitude

For the 2010 Census:

- Less than 40,000 housing units

B.2.6 Enumeration of Hotels and Motels

Process Overview

The *Enumeration of Hotels and Motels* process uses a special enumeration procedure for housing units similar to *Update/Enumerate*, unless the hotel/motel is used as a homeless shelter.

Most hotels and motels will be classified as OLQs during the Address Canvassing Operation and will be referred to the Group Quarters Validation Operation. Two different enumeration methods will be used to enumerate hotels and motels. During the GQV operation, listers will identify hotels/motels that provide shelter to people without housing and will classify the rooms as Group Quarters. These places will be enumerated during the *Service-Based Enumeration* (SBE) process.

For hotels and motels not operated as a shelter, listers will obtain or verify basic information about each location, such as the name of the place, name and title of contact person, phone number of establishment, number of room, and so forth. Hotels/motels with permanent units will be visited at the time of the Census. Rooms occupied by persons with no usual home elsewhere

(UHE) will be identified and enumerated as part of the housing unit enumeration using a methodology similar to *Update/Enumerate*.

The questionnaire used to enumerate the population is the same questionnaire used during the *Update/Enumerate* operation.

Schedule

Event	Time Frame
Dress Rehearsal	April 1, 2008 – May 15, 2008
2010 Census	April 1, 2010 – May 15, 2010

Order of Magnitude

For the 2010 Census:

- ~84,000 hotels/motels

B.2.7 Transient Night (T-Night)

Process Overview

The *Transient Night (T-Night)* process is designed to enumerate people whose living arrangements are of a highly transient nature. The *T-Night* operation is dependent upon the results of the GQV operation. On T-Night, enumerators visit and interview people occupying commercial or public recreational vehicle (RV) campgrounds or parks, racetracks, fairs and carnivals, military hotels, and marinas. The enumerator will:

- Create a list of all occupied units/sites/slips
- Conduct a personal visit interview at all occupied sites
- Complete a questionnaire and add housing units for those who do not have a usual home elsewhere.

T-Night enumeration will use a methodology similar to *Update/Enumerate*. The T-Night methodology differs because (1) T-Night enumerators only canvass the occupied units/slips/sites at the transient locations, (2) the questionnaire is completed when the respondent does not have a usual home elsewhere, and (3) the universe of cases comes from the GQV operation.

The questionnaire used to enumerate the T-Night population is the same questionnaire used during the *Update/Enumerate* operation.

Schedule

Event	Time Frame
Dress Rehearsal	March 31, 2008
2010 Census	March 31, 2010

Order of Magnitude

For the 2010 Census:

- ~15,000 T-Night places

B.2.8 Special Place/Group Quarters Advance Visit

Process Overview

The *Special Place/Group Quarters (SP/GQ) Advance Visit* process provides information needed to prepare administrators and residents at Group Quarters for the upcoming census enumeration (see the *Group Quarters Enumeration* operation and the *Service-Based Enumeration* operation). The *SP/GQ Advance Visit* process is dependent upon results from the GQV Operation.

Census staff will visit each GQ, such as a skilled nursing facility, college dormitory, and soup kitchen, as well as some administrative offices at hospitals, colleges and universities, and correctional institutions. During the visit, Census staff will:

- Describe the upcoming enumeration and make arrangements to conduct the enumeration
- Address privacy and confidentiality concerns
- Request the cooperation of the GQ and inform the residents about required confidentiality procedures
- Update the facilities' expected population count on Census Day and collect other information needed for the enumeration.

Schedule

Event	Time Frame
Dress Rehearsal	January 18, 2008 – March 3, 2008
2010 Census	January 18, 2010 – March 3, 2010

Order of Magnitude

For the 2010 Census:

- ~300,000 Special Places and Group Quarters

B.2.9 Group Quarters Enumeration

Process Overview

The *Group Quarters Enumeration* process entails visiting all living quarters classified as Group Quarters and enumerating the people present. This operation is dependent upon the results from the *SP/GQ Advance Visit* process. At the group quarters, Census staff will:

- Complete a list of all the residents
- Distribute questionnaire packets to residents and assist with completing the questionnaire, when needed
- Collect completed questionnaires
- Verify that residents are enumerated.

The questionnaire used in this operation is called an Individual Census Report (ICR). This questionnaire is out of scope for the FDCA Program.

Schedule

Event	Time Frame
Dress Rehearsal	April 1, 2008 – May 15, 2008
2010 Census	April 1, 2010 – May 15, 2010

Order of Magnitude

For the 2010 Census:

- ~250,000 group quarters

B.2.10 Service-Based Enumeration

Process Overview

The *Service-Based Enumeration* process is designed to enumerate people without conventional housing who may be missed in the traditional enumeration of housing units and group quarters. This operation is dependent upon the results from the SP/GQ Advance Visit operation. The Census Bureau will develop procedures to enumerate people at selected locations that serve people without conventional housing. The service-based locations are emergency and

transitional shelters, hotels and motels used to provide shelter for people experiencing homelessness, soup kitchens, and regularly scheduled mobile food vans. In addition to the service locations listed above, Census staff will also enumerate people at targeted nonsheltered outdoor locations.

The questionnaire used to enumerate the population at service locations is outside the scope of the FDCA Program.

Schedule

Event	Time Frame
Dress Rehearsal	March 22–27, 2008
2010 Census	March 2010

Order of Magnitude

For the 2010 Census:

- ~88,000 service locations

B.2.11 Military Advance Visit

Process Overview

The *Military Advance Visit* process entails having Census staff visit each installation to meet with the designated Project Officer for that installation. During the visit, each Project Officer will become a sworn census representative and will receive the necessary training to conduct the enumeration. Arrangements to train other military representatives will be made during the visit.

Schedule

Event	Time Frame
Dress Rehearsal	January 18, 2008 – March 3, 2008
2010 Census	January 18, 2010 – March 3, 2010

Order of Magnitude

For the 2010 Census:

- Advance visit workload of ~900 military installations

B.2.12 Military Group Quarters Enumeration

Process Overview

In the *Military Advance Visit* process, the Census Bureau works with the Department of Defense and the U.S. Coast Guard to enumerate people residing on military installations in the U.S. and on military ships assigned to home ports in the U.S.

Housing units on military installations will receive a household questionnaire. People living in barracks will be enumerated during the enumeration of group quarters. Census staff will train and swear in unit representatives of the military to conduct the enumeration of group quarters. Once the enumeration is completed, census staff will return to the installation to pick up completed questionnaires.

The questionnaire used to enumerate the military population in barracks is outside the scope of the FDCA Program.

Schedule

Event	Time Frame
Dress Rehearsal	April 1, 2008 – April 14, 2008
2010 Census	April 1, 2010 – April 14, 2010

Order of Magnitude

For the 2010 Census:

- ~900 military installations

B.2.13 Be Counted

Process Overview

The *Be Counted* process (and program) provides a means for people to be included in the census who may not have received a census questionnaire or believe that they were not included on a census questionnaire. The Be Counted form is paper only and contains the same short form questions as the questionnaire along with additional address questions needed to correctly geocode and process the completed forms. Be Counted forms will be available to the public in pre-determined locations; the forms will be available in English and other languages.

Census staff will visit the Be Counted sites and will provide updated information as necessary to the LCOs. The Be Counted site visits need to be controlled and the operation integrated with the Partnership Program database.

Schedule

TBD

Order of Magnitude

For the 2010 Census:

- ~40,000 Be Counted sites

B.2.14 Census Coverage Measurement

This evaluation is described under Section B.1 Operations Using Mobile Computing Equipment for Field Data Collection. Currently, the Census Bureau plans to include only the Person Interview process within the scope for use of MCE but all CCM operations are in scope for the FDCA Field Operations Control process described in Section A.2.2.

B.2.15 Other Evaluation and Experiment Processes

The evaluation program is still being designed and there may be up to 10 additional programs designed that may require field data collection. None of these processes will be as large as Census Coverage Measurement; however, they may involve additional application development.

Experiments are conducted during the census on samples of census cases to identify improvements to future censuses. Experiments may be embedded in any census data collection process and may require alternative methods, procedures, automated questionnaires, or changes to the basic census process.

Appendix C. General Automation Considerations

The considerations of security, systems integration, technical support, and unique Census Bureau functionality—Automated Questionnaires (Instruments) Design and Automated Mapping and Listing Capabilities—apply to all aspects of the Field Data Collection Automation (FDCA) Program and the processes it will support. The following sections present a brief description of these considerations and their importance to the FDCA Program.

C.1 Security

Security includes all activities needed to secure electronic data and other technology assets of the U.S. Census Bureau in the temporary Decennial Census Field infrastructure.

According to 13 U.S.C. §9, the Census Bureau must preserve the confidentiality of all data furnished by individuals. This provision protects individually identifiable data produced, associated with, or used by FDCA-supported business processes described in Appendix B of this document. Title 13 confidentiality protections exist independently from other federal legislation prescribing information technology (IT) security and may, in a specific context, impose additional requirements. Any FDCA system, network, application, or other component must be so engineered as to assure Title 13 compliance.

The Federal Information Security Management Act (FISMA) of 2002 specifies the overarching framework of agency IT security requirements. All FDCA systems must be certified and accredited, in advance of production, in accordance with the modified National Information Assurance Certification and Accreditation Process (NIACAP). For guidance on this process and related agency IT security policies, see <http://www.osec.doc.gov/cio/oipr/ITSec/DOC-IT-Security-Program-Policy.htm>. FDCA systems will also need to conform to applicable Federal Information Processing Standards (FIPS) and related National Institute of Standards and Technology (NIST) Special Publications (especially the 800 Series) pertaining to computer security. NIST guidance is available online at <http://www.itl.nist.gov/itl-publications.html>.

Automation Considerations

- Systems must conform to prevailing security standards at time of deployment
- Security implementation should not adversely impact usability.

C.2 Systems Integration

IT systems and applications deployed to the field will require either an interface to or integration with other systems that support the Decennial Census effort. These systems may be internal to the Census Bureau, such as Decennial Applicant, Personnel and Payroll System (DAPPS), Decennial Response Integration System (DRIS) or Overnight Shipping Vendor systems.

The FDCA Program will include numerous applications, systems, and telecommunication components. These components must appear seamless to the user and be highly integrated. The following types of interfaces will be required:

- File exchanges/transfers
 - Secure transmissions
 - Multiple file formats
 - Internal Census Bureau network
 - Outside Census Bureau firewall
 - Data Imports
 - Data Exports
- Logical links
 - Internal Census Bureau network
 - Multiple Databases (internal and external)
- Limited/Restricted internet access
- Census Bureau intranet access.

Any updates to a part of the system, particularly those that reside locally on office automation equipment or MCE, will be deployed and installed in such a way to ensure that data are collected consistently during census operations (for example, every field worker will use the same version of an instrument application as all the other field workers).

C.3 Technical Support

The *Technical Support* process involves providing effective and timely support for all applications, systems, telecommunications, and IT equipment deployed to the field infrastructure. Quick and effective resolutions are required to maintain field data collection operations. Technical support serves as the communication hub for all automation problems, irrespective of the application developer. If problems or questions are identified and unresolved in the field, the appropriate Census staff escalates the problem or question for resolution. All escalated issues must be tracked through timely resolution. All problems must be documented, tracked, and routed to the appropriate person for resolution. Support must be available to all levels of staff within the field organization on a 24x7 at peak times to be defined in the FDCA request for proposal.

Automation Considerations

Technical support is an enormous task, given the heavy and highly variable workloads with large spikes that occur in supporting a large, mobile workforce. The goal of technical support is to minimize enumerator downtime and data loss on any application or system deployed to the field.

C.4 Automated Questionnaires (Instruments) Design Functionality

Census data are collected using questionnaires that are completed by respondents (and returned via mail or the Internet, or completed through a telephone interview), or by temporary census workers who fill out the questionnaires during telephone or personal interviews. Questionnaires guide the respondent and/or enumerator through the data collection process, and structure the information collected.

Different questionnaires are required for each field operation or business process. Questionnaire length, complexity, and other attributes may vary widely across operations or business processes. The Census Bureau will provide the specific questions and edits for the FDCA contractor to incorporate into the automated instruments. All questionnaires receive extensive pretesting, and must combine ease of use with the ability to obtain complete and accurate information concerning the living quarters and/or their residents. The challenge is to promote the uniform administration of the questionnaires by minimally trained workers.

Automated questionnaires will be used to collect census data during Nonresponse Followup and Census Coverage Measurement Person Interview only. These automated questionnaires will provide enhanced support for standardized questionnaire administration and the presentation of dependent data (that is, information obtained during a prior operation or interview). They will eliminate some possible sources of error, e.g., following an incorrect path through the questionnaire, or skipping to an inappropriate series of questions.

Extending the use of automated questionnaires in the 2010 Census will require their presentation (together with payroll, assignment management, communication utilities, and other applications) on devices used by about 500,000 field workers at peak. Mobile Computing Equipment (MCE) is a key feature of the 2010 Census design. Certain instrument capabilities will be common across Nonresponse Followup and Census Coverage Measurement Person Interview. The capabilities of navigation, auditing, use of external files, specific user features, data input, and instrument design are addressed at a high level in the following subsections.

Navigation

Navigation refers to movement and entry capability within the instrument. Typical navigation requirements may include:

- Entry in a field
- Backing up to a prior field
- Changing entries in a field
- Out of sequence movement (e.g., jumping to the appointment section of an instrument for a partial interview, jumping to a particular section of the instrument or to a particular field)
- Parallel block equivalent accessibility (e.g., having access to multiple sections of the instrument at the same time)

- Handling on-path/off-path data (e.g., the ability to handle data as a result of an answer change that results in a different path in the instrument)
- Maintaining the original path during off-path sequences (and marking data as deleted or off-path so it is distinguishable from good or on-path data)
- Re-entry (e.g., ability to exit a case part way through and be able to re-enter the case and begin the interview at that point).

Auditing

Auditing refers to the ability to generate trace or audit files of navigation movements, responses, and keystrokes.

External Files

The ability to call an external data file, call an external program, update instrument data with data from an external source, and provide data from the instrument to an external destination

User Features

Certain user features are critical to design functionality of instruments supporting the use of automated questionnaires in a mobile computing environment:

- Function key shortcuts (if laptop application)
- Don't know and/or refused (e.g., the ability to identify don't know and refused entries as special values that are distinguishable from regular field entries)
- Toggling multi-language capabilities
- Quick exit
- Help features.

Data

- The ability to input dependent (or pre-load) data from a file, such as a control number or address for Census Coverage Measurement – Person Interviews
- The ability to enter rostered input (that is, the ability to have multiple records of the same layout on the screen).

Instrument Design

The ability to design the following functionality:

- Rosters
 - Multiple roster levels
- Tables

- Dynamic fills
- Calculations
- Conditionals
 - Nested Conditionals
- Internal Edits and User Messages.

C.5 Automated Listing and Mapping Capabilities

For the first time in a Decennial Census, the Census Bureau has decided to replace the paper address lists and paper maps it has used in the field for updating the Master Address File (MAF) and the Topologically Integrated Geographic Encoding and Referencing System (TIGER) with a MCE that displays the address list and maps for a given assignment area. The Census Bureau will need synchronization of address list and map updates. The following functionality will be needed to support the listing and mapping capabilities of the MCE.

- **Listing Capabilities.** The MCE will display the addresses for each block selected in the assignment area. The lister must take an action on each displayed address. Therefore, the accompanying software will allow the lister to verify the existence of an address, add addresses that are found on the ground but not in the list, mark for deletion addresses that are on the list but not on the ground, and correct addresses that have errors such as misspelled street names in them. Each MCE will be equipped with a GPS receiver and the lister will capture the GPS coordinate for each address that is verified, corrected or added to the list.
- **Mapping Capabilities.** The MCE will display maps generated from the TIGER database. Individual maps will allow the lister to navigate to and within his/her assignment area. The maps will have pan and zoom capabilities, allowing the user to focus on the particular block or street they are covering. The software will highlight the assignment area and the block selected for listing. Using the GPS, the lister will be able to add, correct, or delete street features where discrepancies are found between the map and the ground.

Acronyms

AC	Address Canvassing
CAMS	Commerce Administrative Management System
CCM	Census Coverage Measurement
CFR	Code of Federal Regulations
CHEC	Census Hiring and Employment Check
CL	Crew Leader
CLA	Crew Leader Assistant
CLD	Crew Leader District
COTS	Commercial Off-The-Shelf
DMD	Decennial Management Division
DRIS	Decennial Response Integration System
FDCA	Field Data Collection Automation
FIPS	Federal Information Processing Standards
FISMA	Federal Information Systems Management Act
FOS	Field Office Supervisor
GPS	Global Positioning System
GQ	Group Quarters
GQV	Group Quarters Validation
GSA	General Services Administration
HHC	Hand-held Computer
HQ	Headquarters
HQDP	Headquarters Data Processing
ICR	Individual Census Report
IDS	Integrated Dissemination System
IT	Information Technology
IVR	Interactive Voice Response
LAN	Local Area Network
LCO	Local Census Office
MAF/TIGER	Master Address File/Topologically Integrated Geographic Encoding and Referencing System

MCE	Mobile Computing Equipment
NIACAP	National Information Assurance Certification and Accreditation Process
NIST	National Institute of Standards and Technology
NPC	National Processing Center
NRFU	Nonresponse Followup
OLQ	Other Living Quarters
OPM	Office of Personnel Management
QC	Quality Control
RCC	Regional Census Center
RV	Recreational Vehicle
SBE	Service-Based Enumeration
SP/GQ	Special Place/Group Quarters
SSA	Social Security Administration
UHE	Usual Home Elsewhere
USPS	United States Postal Service
WAN	Wide Area Network

Note: Additional definitions of relevant U.S. Census Bureau terms appear at <http://www.census.gov/dmd/www/glossary.html>